

Our ref: 11053P1 WO/KH/JMH.lm

Your ref:

Date: 21 August 2004

BY FACSIMILE & POST

The International Preliminary Examining Authority
The European Patent Office
Erhardtstrasse 27
D 80331 Munich
GERMANY

Dear Sirs

International Patent Application No. PCT/GB 03/02801
RECKITT BENCKISER (UK) LIMITED et al
Deadline for Response: 23 October 2004

I write in response to the Written Opinion issued in respect of the above application on 23 September 2004.

I enclose replacement pages 2, 3 and 12 to 15 in triplicate to replace pages 2, 3 and 12 to 16 currently on file. A set of hand amended pages is enclosed for your convenience.

Claim 1 has been amended to include the features that the flexible thin film heater comprises a laminate having at least one laminar of resistive material and two insulating laminars attached to opposed surfaces of the resistive material laminar. The basis for these changes may be found, for example, in original claims 2, 5 and 6.

In the Written Opinion, the Examiner has acknowledged that the amended claim is novel over D1 and D2.

It is submitted that the claim is also inventive. None of the prior art cited teaches an electrically heated apparatus as set out in claim 1 or fairly suggests such an arrangement. The skilled person would not be motivated in light of the art cited by the Examiner to modify the disclosed heating devices to arrive at the claimed apparatus.

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Re-examination of [REDACTED] application is respectfully requested. I [REDACTED] forward to receipt of the International Preliminary Examination Report in due course.

EPO Form 1037 is enclosed to enable you to acknowledge receipt.

Yours faithfully

ANDREW STEPHEN BROWN
RECKITT BENCKISER plc

h/hq/patents/shared/jmh/correspondence/11053P1 WO-2

the fragrance in the enclosed volume of the room.

Attempts have been made to provide an electrically heated vapour dispensing apparatus which operates from a portable power supply, such as batteries. However, such apparatus suffer from two main drawbacks. Firstly, they are under-powered such that they have difficulty in heating the fragrance or other volatile substance to the required temperature, as well as heating the volatile substance sufficiently rapidly. Secondly, batteries are not able to volatilise the fragrance for a long enough period to be acceptable to consumers. With many conventional apparatus the operating life of a battery power source would be only a matter of hours.

According to the present invention, there is provided an electrically heated apparatus for dispensing fragrancing materials and other volatile substances to an enclosed volume comprising a container containing a quantity of a volatile substance, heating means, transfer means for transferring said volatile substance towards said heating means and a portable power supply for energising said heating means, characterised in that said heating means comprises a flexible thin film heater comprising a laminate having at least one laminar of resistive material and two insulating laminars attached to opposed surfaces of the resistive material laminar. Other aspects of the present invention are defined in the attached claims.

Embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings in which:-

Figure 1 is a schematic cross-sectional view through a first embodiment of electrically heated vapour dispensing apparatus according to the present invention;

a second embodiment of electrically heated vapour dispensing apparatus according to the present invention;

Figure 3 is a schematic cross-sectional view through
5 a third embodiment of electrically heated vapour dispensing apparatus according to the present invention;

Figure 4 is a schematic cross-sectional view through a fourth embodiment of electrically heated vapour dispensing apparatus according to the present invention;

10 Figure 5 is a plan view of a heating means for use in the apparatus of Figure 1 to 4; and

Figure 6 is a cross-sectional view of the heating means taken on line VI-VI of Figure 5.

Figure 1 shows a first embodiment of electrically
15 heated vapour dispensing apparatus 1 which comprises a housing 2 containing a fragrance reservoir 4, a capillary tube 5, a porous element 6, heating means 7, control circuitry (not shown) and a portable power supply (not shown).

20 The housing 2 has a planar base 9 allowing the apparatus 1 to be stood upright on a flat surface. The housing 2 defines an interior 10 of the apparatus 1 in which the other components of the apparatus 1 are located. At or near an upper end of the housing 2 are
25 provided a number of air holes 3 providing communication between the interior 10 and the surrounding atmosphere. The air holes 3 allow volatilised fragrance to emanate from the interior 10.

The housing 2 may be formed from a thermoplastic or
30 thermosetting polymeric material which has sufficient heat tolerance such that it is not undesirably softened or melted when the heating means 7 is energised during normal use of the apparatus 1. Typical examples of known materials which would be suitable include polymers and/or
35 co-polymer resin compositions based on:- nylons,

1. An electrically heated apparatus for dispensing
fragrancing materials and other volatile
substances to an enclosed volume comprising a
container containing a quantity of a volatile
substance, heating means, transfer means for
transferring said volatile substance towards
said heating means and a portable power supply
for energising said heating means, characterised
in that said heating means comprises a flexible
thin film heater comprising a laminate having at
least one laminar of resistive material and two
insulating laminars attached to opposed surfaces
of the resistive material laminar.

2. Electrically heated apparatus as claimed in
claim 1 wherein the resistive material has
positive temperature coefficient
characteristics.

3. Electrically heated apparatus as claimed in
claim 1 or claim 2 wherein the resistive
material is a polymer thick film material or a
polymer thin film material.

4. Electrically heated apparatus as claimed in any
preceding claim wherein the resistive material
is formed at least partially from resistive ink.

5. Electrically heated apparatus as claimed in any
of claims 1 to 3 wherein the resistive material
is formed at least partially from resistive
wire.

- claim 4 or claim 5 wherein the laminar of resistive material is formed from one or more layers of resistive ink and/or resistive wire each layer having a thickness of between 10 and 1000 microns.
- 5
7. Electrically heated apparatus as claimed in claim 4 or claim 5 wherein the laminar of resistive material is formed from one or more layers of resistive ink and/or resistive wire each layer having a thickness of between 10 and 100 microns.
- 10
8. Electrically heated apparatus as claimed in claim 4 or claim 5 wherein the laminar of resistive material is formed from one or more layers of resistive ink and/or resistive wire each layer having a thickness of between 20 and 50 microns.
- 15
- 20
9. Electrically heated apparatus as claimed in any preceding claim wherein the thin film heater has an overall thickness of between 20 and 1000 microns.
- 25
10. Electrically heated apparatus as claimed in any preceding claim wherein the thin film heater has an overall thickness of between 40 and 100 microns.
- 30
11. Electrically heated apparatus as claimed in any preceding claim wherein the portable power supply comprises one or more battery cells.
- 35

claim 11 wherein the battery cells are rechargeable.

- 5 13. Electrically heated apparatus as claimed in any preceding claim wherein said transfer means comprises a capillary tube.
- 10 14. Electrically heated apparatus as claimed in any of claims 1 to 12 wherein said transfer means comprises a wick or capillary film.
- 15 15. Electrically heated apparatus as claimed in claim 14 wherein said heating means is attached to or held in proximity to said wick or capillary film.
- 20 16. Electrically heated apparatus as claimed in claim 15 wherein said heating means is located at least partially within said wick.
- 25 17. Electrically heated apparatus as claimed in claim 16 wherein said wick is cylindrical and said heating means is located in a bore of the cylinder.
- 30 18. Electrically heated apparatus as claimed in claim 15 wherein said heating means is wrapped at least partially around an outer surface of said wick.
- 35 19. Electrically heated apparatus as claimed in any preceding claim further comprising timing means operable to energise said heating means periodically.

20. Electrically heated apparatus as claimed in claim 19 wherein the periodicity is pre-programmed.

5

21. Electrically heated apparatus as claimed in claim 19 wherein the periodicity is user defined.

10 22. Electrically heated apparatus as claimed in any of claims 19 to 21 wherein each period of energisation is for between 1 second and 5 minutes.

15 23. Electrically heated apparatus as claimed in any of claims 19 to 21 wherein each period of energisation is for between 1 second and 1 minute.

20 24. Electrically heated apparatus as claimed in any of claims 19 to 21 wherein each period of energisation is for between 1 second and 10 seconds.

25 25. Electrically heated apparatus as claimed in any of claims 19 to 21 wherein each period of energisation is for between 1 second and 5 seconds.

30 26. Electrically heated apparatus as claimed in any preceding claim further comprising timing means operable to switch said heating means periodically from a low power state to a high power state.

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Attempts have been made to provide an electrically heated vapour dispensing apparatus which operates from a portable power supply, such as batteries. However, such apparatus suffer from two main drawbacks. Firstly, they are under-powered such that they have difficulty in heating the fragrance or other volatile substance to the required temperature, as well as heating the volatile substance sufficiently rapidly. Secondly, batteries are not able to volatilise the fragrance for a long enough period to be acceptable to consumers. With many conventional apparatus the operating life of a battery power source would be only a matter of hours.

According to the present invention, there is provided an electrically heated apparatus for dispensing fragrancing materials and other volatile substances to an enclosed volume comprising a container containing a quantity of a volatile substance, heating means, transfer means for transferring said volatile substance towards said heating means and a portable power supply for energising said heating means, characterised in that said heating means comprises a flexible thin film heater. Other aspects of the present invention are defined in the attached claims.

Embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings in which:-

Figure 1 is a schematic cross-sectional view through a first embodiment of electrically heated vapour dispensing apparatus according to the present invention;

Figure 2 is a schematic cross-sectional view through a second embodiment of electrically heated vapour dispensing apparatus according to the present invention;

comprising a laminate having at least one laminar of resistive material and two insulating² laminars attached to opposed surfaces

to page 3

Figure 3 is a schematic cross-sectional view through a third embodiment of electrically heated vapour dispensing apparatus according to the present invention;

Figure 4 is a schematic cross-sectional view through a fourth embodiment of electrically heated vapour dispensing apparatus according to the present invention;

Figure 5 is a plan view of a heating means for use in the apparatus of Figure 1 to 4; and

Figure 6 is a cross-sectional view of the heating means taken on line VI-VI of Figure 5.

Figure 1 shows a first embodiment of electrically heated vapour dispensing apparatus 1 which comprises a housing 2 containing a fragrance reservoir 4, a capillary tube 5, a porous element 6, heating means 7, control circuitry (not shown) and a portable power supply (not shown).

The housing 2 has a planar base 9 allowing the apparatus 1 to be stood upright on a flat surface. The housing 2 defines an interior 10 of the apparatus 1 in which the other components of the apparatus 1 are located. At or near an upper end of the housing 2 are provided a number of air holes 3 providing communication between the interior 10 and the surrounding atmosphere. The air holes 3 allow volatilised fragrance to emanate from the interior 10.

The housing 2 may be formed from a thermoplastic or thermosetting polymeric material which has sufficient heat tolerance such that it is not undesirably softened or melted when the heating means 7 is energised during normal use of the apparatus 1. Typical examples of known materials which would be suitable include polymers and/or co-polymer resin compositions based on:- nylons,

1. An electrically heated apparatus for dispensing
fragrancing materials and other volatile
substances to an enclosed volume comprising a
container containing a quantity of a volatile
substance, heating means, transfer means for
transferring said volatile substance towards
said heating means and a portable power supply
for energising said heating means, characterised
in that said heating means comprises a flexible

thin film heater, comprising a laminate having at least one laminar
of resistive material and two insulating laminars attached to opposed surfaces of the
resistive material laminar.

- ~~2. Electrically heated apparatus as claimed in
claim 1 wherein said thin film heater comprises
a laminar of resistive material.~~

2. 3. Electrically heated apparatus as claimed in
claim 2 wherein the resistive material has
positive temperature coefficient
characteristics.

- ~~4. Electrically heated apparatus as claimed in any
of claims 2 to 3 wherein the thin film heater
comprises a laminate having at least one laminar
of resistive material and at least one laminar
of insulating material.~~

- ~~5. Electrically heated apparatus as claimed in
claim 4 wherein the laminate comprises two
insulating laminars attached to opposed surfaces
of the resistive material laminar.~~

~~Electrically heated apparatus as claimed in any~~
of ~~claims 2 to 5~~ wherein the resistive material
is a polymer thick film material or a polymer
thin film material.

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4 ~~7~~. Electrically heated apparatus as claimed in any *preceding claim*
of ~~claims 2 to 5~~ wherein the resistive material
is formed at least partially from resistive ink.

10 5 ~~8~~. Electrically heated apparatus as claimed in ^{any} ~~and~~
of claims ¹2 to ³5 ~~or 7~~ wherein the resistive
material is formed at least partially from
resistive wire.

15 6 ~~8~~. Electrically heated apparatus as claimed in
claim ⁴7 or claim ⁵8 wherein the laminar of
resistive material is formed from one or more
layers of resistive ink and/or resistive wire
each layer having a thickness of between 10 and
20 1000 microns.

7 ~~10~~. Electrically heated apparatus as claimed in
claim ⁴7 or claim ⁵8 wherein the laminar of
resistive material is formed from one or more
25 layers of resistive ink and/or resistive wire
each layer having a thickness of between 10 and
100 microns.

8 ~~11~~. Electrically heated apparatus as claimed in
claim ⁴7 or claim ⁵8 wherein the laminar of
30 resistive material is formed from one or more
layers of resistive ink and/or resistive wire
each layer having a thickness of between 20 and
50 microns.

- 9 ~~12~~. Electrically heated apparatus as claimed in any preceding claim wherein the thin film heater has an overall thickness of between 20 and 1000 microns.
- 5
- 10 ~~13~~. Electrically heated apparatus as claimed in any preceding claim wherein the thin film heater has an overall thickness of between 40 and 100 microns.
- 10
- 11 ~~14~~. Electrically heated apparatus as claimed in any preceding claim wherein the portable power supply comprises one or more battery cells.
- 15
- 12 ~~15~~. Electrically heated apparatus as claimed in claim ~~14~~¹¹ wherein the battery cell or cells are rechargeable.
- 13 ~~16~~. Electrically heated apparatus as claimed in any preceding claim wherein said transfer means comprises a capillary tube.
- 20
- 14 ~~17~~. Electrically heated apparatus as claimed in any of claims 1 to ~~15~~¹² wherein said transfer means comprises a wick or capillary film.
- 25
- 15 ~~18~~. Electrically heated apparatus as claimed in claim ~~17~~¹⁴ wherein said heating means is attached to or held in proximity to said wick or capillary film.

- 16 ~~19~~. Electrically heated apparatus as claimed in claim ~~18~~¹⁵ wherein said heating means is located at least partially within said wick.
- 5 17 ~~20~~. Electrically heated apparatus as claimed in claim ~~19~~¹⁶ wherein said wick is cylindrical and said heating means is located in a bore of the cylinder.
- 10 18 ~~21~~. Electrically heated apparatus as claimed in claim ~~18~~¹⁵ wherein said heating means is wrapped at least partially around an outer surface of said wick.
- 15 19 ~~22~~. Electrically heated apparatus as claimed in any preceding claim further comprising timing means operable to energise said heating means periodically.
- 20 20 ~~23~~. Electrically heated apparatus as claimed in claim ~~22~~¹⁹ wherein the periodicity is pre-programmed.
- 21 ~~24~~. Electrically heated apparatus as claimed in claim ~~22~~¹⁹ wherein the periodicity is user defined.
- 25 22 ~~25~~. Electrically heated apparatus as claimed in any of claims ~~22~~¹⁹ to ~~24~~²¹ wherein each period of energisation is for between 1 second and 5 minutes.
- 30 23 ~~26~~. Electrically heated apparatus as claimed in any of claims ~~22~~ to ~~24~~ wherein each period of

energisation is for between 1 second and 1 minute.

5 24 27. Electrically heated apparatus as claimed in any
of claims ¹⁹22 to ²¹24 wherein each period of
energisation is for between 1 second and 10
seconds.

10 25 28. Electrically heated apparatus as claimed in any
of claims ¹⁹22 to ²¹24 wherein each period of
energisation is for between 1 second and 5
seconds.

15 26 29. Electrically heated apparatus as claimed in any
preceding claim further comprising timing means
operable to switch said heating means
periodically from a low power state to a high
power state.

20 ~~30. Electrically heated apparatus substantially as
hereinbefore described with reference to or as
shown in the accompanying drawings.~~

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